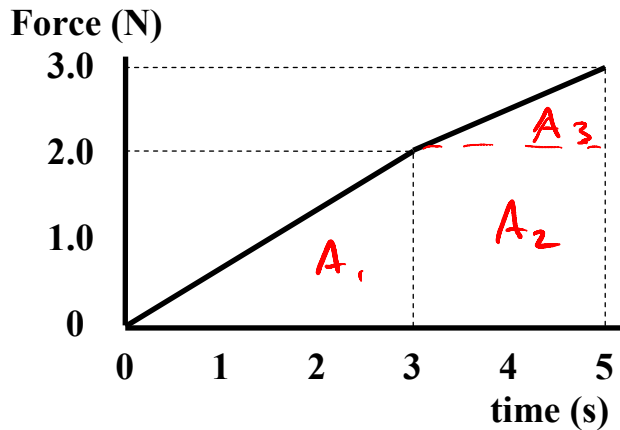


**Example #7:** A changing net force acts on a 3.5 kg cart for 5.0 s, and is recorded on a Force-Time graph:



- a) What is the total impulse?  
b) What final velocity would the 3.5 kg mass have, travelling in a straight line, if its initial speed was 4.0 m/s?

a) Since  $\Delta p = Ft$ ,  $\Delta p = \text{area under the graph}$

$$\begin{aligned}\Delta p &= A_1 + A_2 + A_3 \\ &= \frac{1}{2}(3)(2) + 2(2) + \frac{1}{2}(2)(1)\end{aligned}$$

$$\boxed{\Delta p = 8.0 \text{ N}\cdot\text{s}}$$

b)  $\Delta p = m(v_f - v_i)$   
 $8.0 = 3.5(v_f - 4.0)$

$$\boxed{v_f = 6.3 \text{ m/s}}$$